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First Annual Report
Advisory Committee on Heavy Oil and Oil Sands Development

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Advisory Committee on Heavy Oil and Oil Sands Development

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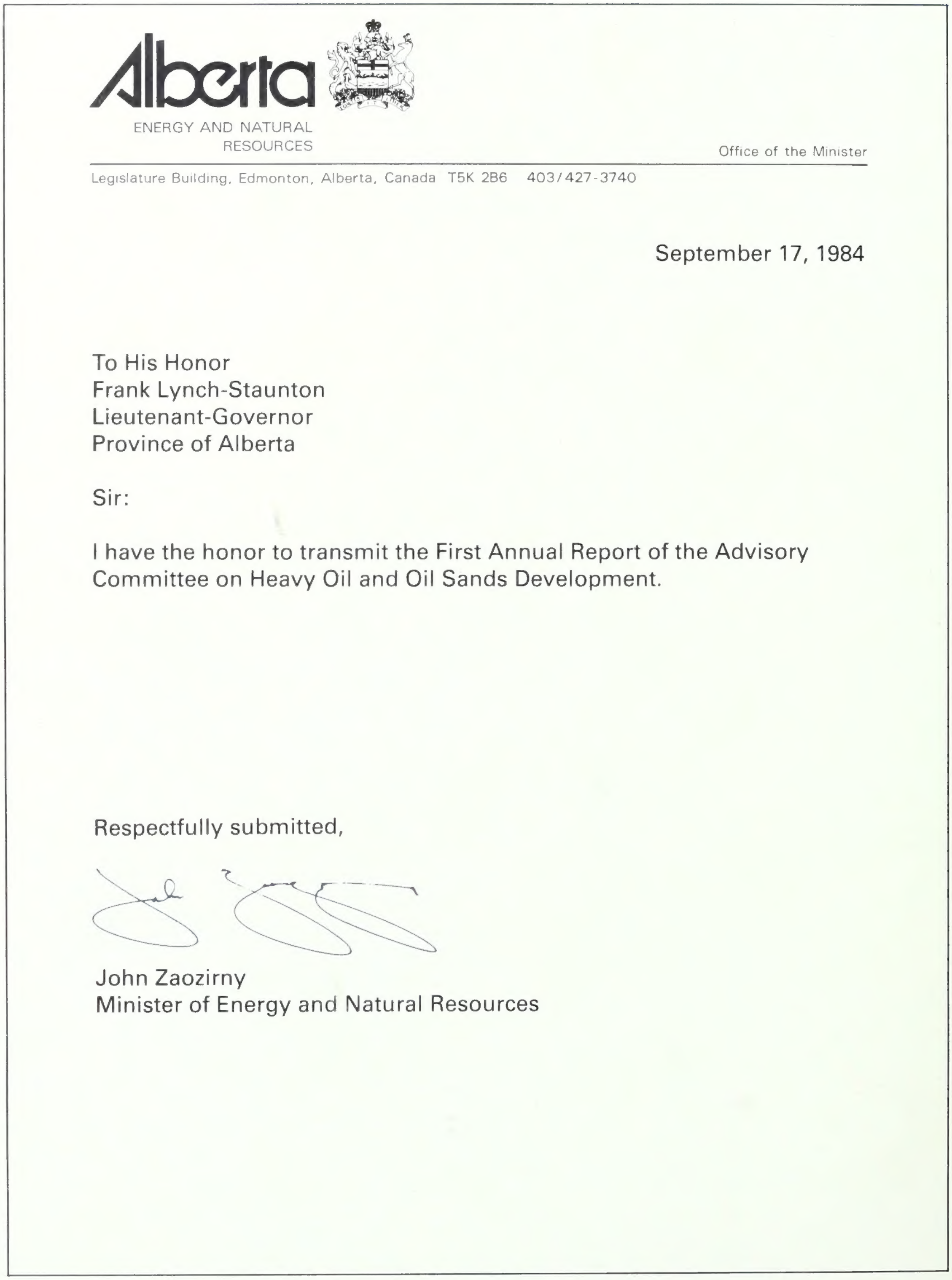
Alberta
ENERGY AND NATURAL
RESOURCES



Alberta
ENERGY AND NATURAL
RESOURCES

Office of the Minister

Legislature Building, Edmonton, Alberta, Canada T5K 2B6 403/427-3740

September 17, 1984

To His Honor
Frank Lynch-Staunton
Lieutenant-Governor
Province of Alberta

Sir:

I have the honor to transmit the First Annual Report of the Advisory Committee on Heavy Oil and Oil Sands Development.

Respectfully submitted,

John Zaozirny
Minister of Energy and Natural Resources

LEGISLATIVE ASSEMBLY
ALBERTA

September 17, 1984

To The Honorable John Zaozirny
Minister of Energy and Natural Resources

Sir:

I have the honor to present to you the First Annual Report of the Advisory Committee on Heavy Oil and Oil Sands Development.

Respectfully submitted,

J.E. (Bud) Miller, MLA
Chairman

Statement of the Chairman

In this, the initial year of the committee's operations, considerable attention has been paid to assessing the present status of heavy oil and oil sands development in the Province of Alberta. To work effectively, the committee felt it was necessary to become acquainted with current development activities and both short- and long-range projections of heavy oil developments. Of particular concern is the effect of present development on communities as well as the planning and preparedness for future projects.

In its early role of information gathering, the committee visited some of the most active regions where development is current or expected. The members have met, listened to and discussed on-going and proposed projects with civic and municipal officials, resource developers and producers, and representatives of government as well as non-governmental organizations and people.

During its travels and deliberations, the committee has identified areas for concern which will be monitored closely during the next year. Present emphasis is on smaller projects in heavy oil recovery rather than on the mega-projects of a few years ago. Because of their sheer magnitude, mega-projects demanded the full and immediate attention of local communities to plan quickly and commit all possible effort to attempt to cope with the substantial impact that would likely be thrust upon them. As a result of what it has seen and heard in the field, the committee believes that, in total, the proposed mini-projects could have a substantially greater and wider effect or impact than that of any earlier proposed mega-project.

The mandate of this committee is to establish and co-ordinate continuing communication among all parties affected by the development of the heavy oil and oil sands resource. It believes that, learning from the lessons of past projects, future development can follow a smoother course; many of the problems seemingly inherent in accelerated community growth can be minimized. This will require co-operation and the co-ordinated efforts of all concerned to avoid unnecessary upheavals. To strive toward those objectives is the goal of the committee for the coming year.

The committee has had a fulfilling year to the extent that it has developed an intelligent awareness of the industry itself and has listened thoughtfully to the grass-roots views of people active in the industry and in the centres serving the industry. In addition, it hopes it has been able to facilitate and prompt more effective dialogue and communication that will prove beneficial to individuals, municipalities, government departments and the industry.

In summary, the committee has found an air of renewed confidence and expectation in the continued orderly growth of our province and in the development of its massive resource potential.

Bud Miller

J.E. (Bud) Miller, MLA
Chairman

History of the Committee

The Advisory Committee on Heavy Oil and Oil Sands Development was established under the Department of Energy and Natural Resources Amendment Act, 1983 (Revised Statutes of Alberta, 1983, C. 24). The legislation received royal assent on June 6, 1983, and the committee held its first meeting the following month, on July 4, in Edmonton.

In recognition of the impact made on communities by their accelerated growth due to heavy oil and oil sands development, the committee was formed to monitor such activity and to anticipate growth problems.

The functions of the Advisory Committee are to provide a continuing liaison between the Government of Alberta and the representatives of communities that are or may be affected by the possible development of heavy oil or oil sands resources in the vicinity of those communities.

It will advise the government on the need for timing of the implementation of government programs to provide public services and facilities in areas of Alberta affected by the further development of heavy oil or oil sands resources, in keeping with the pace and scale of that development.

As well, the committee will receive and assess the concerns of residents in the vicinity of proposed further developments of heavy oil and oil sands resources respecting the possible effects of such developments on communities, and will ensure that those concerns and suggestions are brought to the attention of the government and dealt with in a co-ordinated manner.

In general, it will establish and co-ordinate continuing communication among the organizations engaging in the business of the further development of heavy oil and oil sands resources, the residents of communities of Alberta directly affected by that development, and the various departments and agencies concerned in its regulation.

Committee Membership

The legislation which established the Advisory Committee on Heavy Oil and Oil Sands Development also prescribes its membership. This assures balanced representation on the committee and helps to provide on-going communication with communities within the areas of heavy oil activity. The chairman is a member of the Legislative Assembly of Alberta. Three members are appointed to represent residents of heavy oil and oil sands areas. Industry, the Energy Resources Conservation Board and the Alberta Department of Energy and Natural Resources are also represented.

The formation of this committee has brought together a panel of individuals with experience, expertise and insight pertinent to the technology and socio-economic impact of heavy oil and oil sands resource development in Alberta.

The Advisory Committee on Heavy Oil and Oil Sands Development

J.E. (Bud) Miller, MLA
Chairman

Neil Gilliat
Slave Lake

Don McGladdery
Fort McMurray

Bill Slawuta
Bonnyville

Norm Strom
Energy Resources
Conservation Board

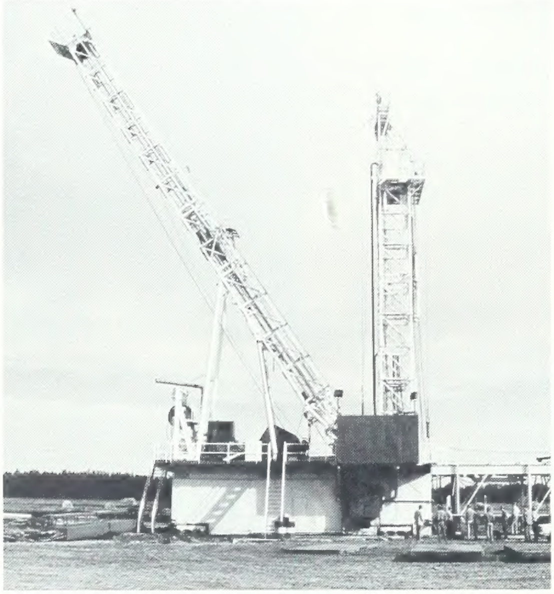
Dick Aberg
Industry

Les Cooke
Alberta Energy
and Natural Resources

Norm Gaelick
Executive Director

Resources and Development

During the past year, the oil sands and heavy oil industry has continued to expand at a robust pace. Major developments during the 1970s were focused on Fort McMurray, and in the 1980s we are witnessing rapid expansion over a wide front. Major in-situ projects are now underway or being built at Cold Lake, Wolf Lake, Bonnyville, Elk Point, Lindbergh and Lloydminster in east-central Alberta. A project is being launched at Peace River and other potential developments in the Wabasca and Fort McMurray areas are being discussed.



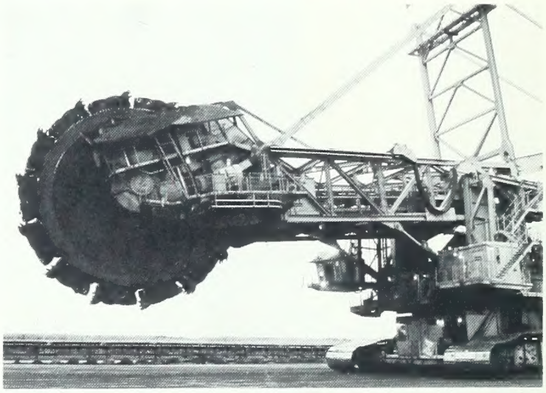
Forecasts developed by the Energy Resources Conservation Board (ERCB) indicate there is a good possibility that total production of bitumen synthetic crude and conventional heavy oil will reach 350 000 barrels a day by 1990 with a target of doubling that daily rate by the year 2000.

The growth in the oil sands and heavy oil industry brings economic development, employment opportunities and cultural benefits. In respect to job creation, ERCB estimates that some 20 000 new jobs will occur in this industry by the end of this decade. Such growth also brings problems, both social and environmental in nature.

Oil sands consist of sand, bitumen and water. Bitumen and water occur in the pore spaces among the grains of sand. The four major oil sands deposits in Alberta are the Athabasca, Wabasca, Cold Lake and Peace River sands. Their characteristics vary considerably and these variations have a major influence on the technology required to recover the oil.

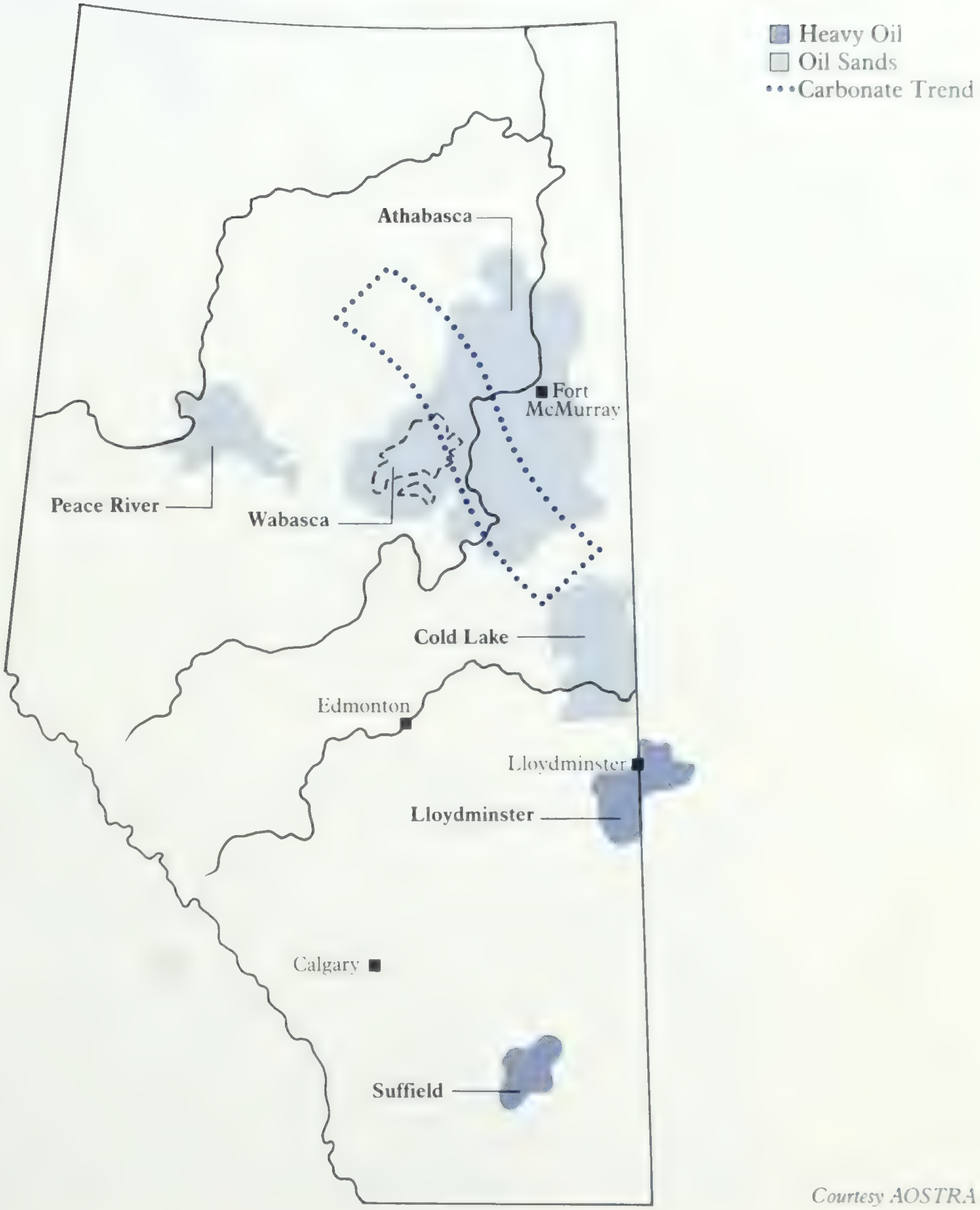
Total in-place reserves of these deposits, excluding the little explored bituminous carbonate reservoir, are estimated at more than 160 billion cubic metres (one trillion barrels).

The best known Canadian deposit is the Athabasca deposit in northeastern Alberta, which contains approximately 114 billion cubic metres (712 billion barrels) of bitumen-in-place. The bitumen content of these sands varies up to a maximum of 18 percent by weight, and the thickness of the pay zone averages 36 m (118 feet) for the surface mining area and 19 m (62 feet) for the in-situ area. Near the Athabasca River, the oil sands are close to the surface and outcrops can be seen on the river escarpment. Away from the river, the depth increases rapidly to a maximum overburden thickness of approximately 500 m (1 640 feet).



The other three oil sands deposits are deeply buried, lying from 150 to 800 m below the surface. The amount of bitumen-in-place at Wabasca is estimated to be six billion cubic metres (38 billion barrels); at Cold Lake, 25 billion cubic metres (156 billion barrels);

Alberta Oil Sands and Heavy Oil Deposits



Courtesy AOSTRA

and at Peace River, 10 billion cubic metres (63 billion barrels).

Large quantities of bitumen, estimated to be 50 billion cubic metres (312 billion barrels), also occur in northeastern Alberta in carbonate rocks, the so-called carbonate trend.

In addition, Alberta has many small reservoirs of heavy oil between Lloydminster and Suffield. Heavy oil, unlike the bitumen in the oil sands, will flow into a well bore and can be pumped to the surface, although at relatively slow rates.

The two commercial plants now recovering oil from the Athabasca oil sands are located near the city of Fort McMurray. Both use surface mining equipment to remove the oil sands, and the mined material is conveyed to a processing plant where the bitumen and sand are separated by hot water extraction. However, only four billion cubic metres (25 billion barrels) of the oil sands resource can be recovered by stripping; the remainder is too deeply buried and in-situ methods must be used to recover the bitumen.

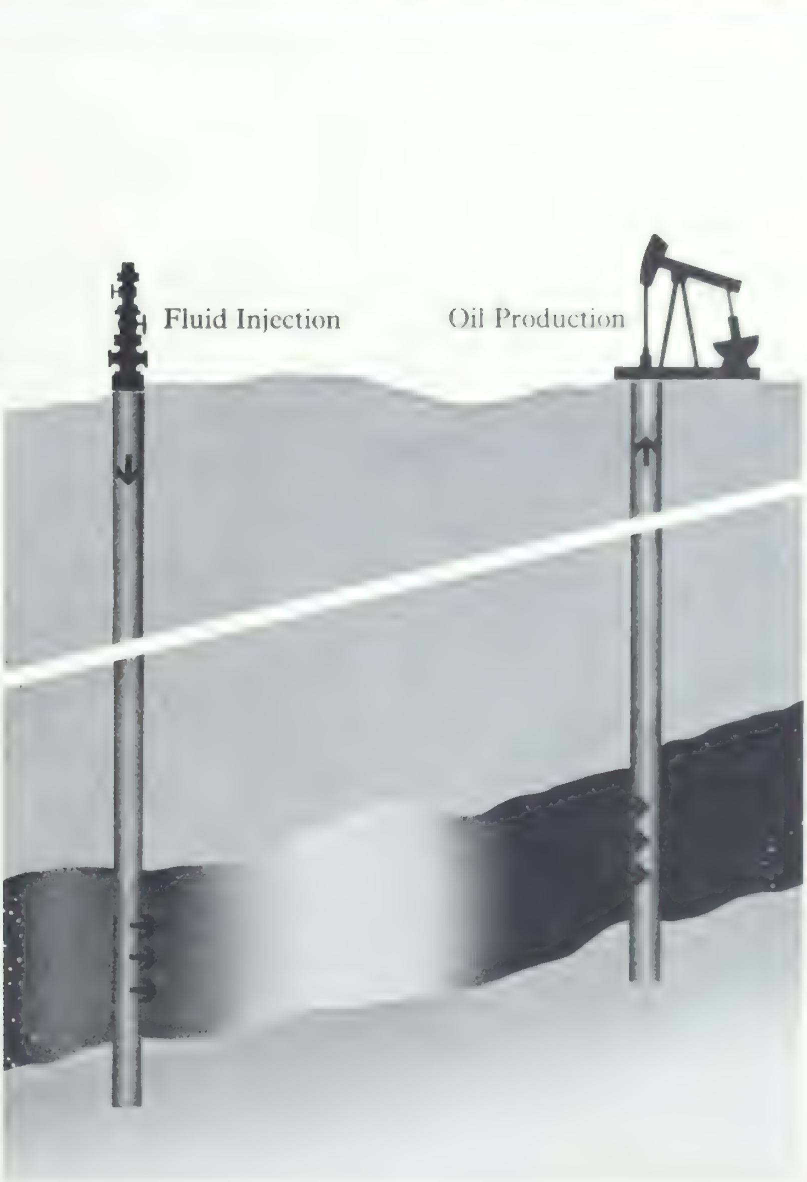
During in-situ operations, the viscosity of the bitumen is reduced by injecting into the deposit heating agents such as steam or air to support underground combustion (or a combination of these). The bitumen will then flow more readily to a well bore for pumping to the surface.

The bitumen obtained from either surface mining or in-situ projects contains a number of impurities, such as sulphur, nitrogen and metals. These materials are removed and the bitumen is broken down into smaller units (cracking), producing a more valuable product, often called synthetic crude oil. This procedure is called upgrading.

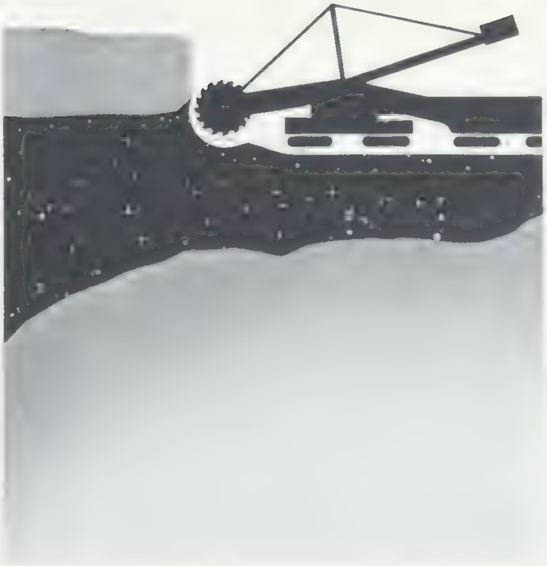
The foregoing information serves to illustrate the magnitude of the resource, development of which can create growth opportunities for communities. It is the intent of the committee to be cognizant of any concerns and to interact with the participants to reach effective solutions to them.

Comparison of Surface Mining and In Situ Methods

IN-SITU



SURFACE MINING



Courtesy AOSTRA

Characteristics of Non-Conventional Oil Deposits

	Estimated Original Oil-in-place ($10^9 m^3$)*	Depth of Deposit (m)*	Gravity (°API)	Sulphur Content (wt. %)	Viscosity at Reservoir Temp. (cp)
OIL SANDS					
Athabasca	114	0-500	8-10	4.8	4 000 000
Cold Lake	25	300-800	10-12	4.4	80 000
Peace River	10	500-800	8-9	6.0	100 000
Wabasca	6	150-800	8-13	6.1	8 000 000
Carbonate Trend	50	280-320	7-8	4.5	1 800 000
HEAVY OILS					
Lloydminster Area	0.6+	600	14-22	2.5	
Southern Alberta Area	0.3+	900	12-18	2.5	1 460
CONVENTIONAL LIGHT OIL FIELD					
Redwater**	0.2+	1000	32	0.5	14

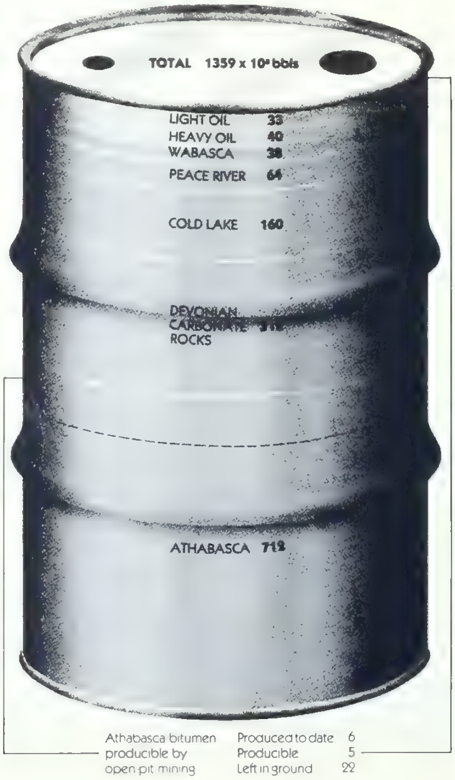
*Conversion factors: $1 m^3 = 6.29$ barrels
$1 m = 3.28$ feet
**Included for comparative purposes

This table summarizes some of the important characteristics of the major oil sands and heavy oil deposits in Alberta, with the characteristics of oil from a typical conventional light oil field (Redwater) shown for comparison. The viscous nature of the heavy oil and bitumen in the oil sands is a major problem in developing recovery methods. The sulphur content is high and must be reduced during any refining or upgrading process before the oil can be competitve with conventional crude.

What's in the Alberta Oil Barrel?

In billions of barrels
of hydrocarbons
in the ground.

☐ Conventional Crude
☐ Bitumen



Courtesy AOSTRA

Committee Activity and Operations

During its first year, the committee devoted much of its time and effort to reviewing the technology of heavy oil recovery and gaining first-hand knowledge of the communities and the environment in areas where heavy oil activity was anticipated. It sought to acquire technological facts as well as an appreciation of development from the community point of view.

To accomplish these preliminary objectives, the committee travelled to Peace River, Wabasca, Fort McMurray, Bonnyville, Cold Lake, Elk Point and Lloydminster. It visited each area studying production facilities, pilot projects and proposed developments.

Aerial perspective and overviews assisted the committee in its assessment of projects relative to transportation routes and probable impact on agriculture, forestry and other land uses in the area. Many other communities in the vicinity of the larger centers were also visited by the committee.

Public receptions were held to provide a more structured opportunity for discussion. The committee met and listened to elected and appointed officials of local governments, resource developers and producers, and representatives of local businesses and organizations, particularly those associated with petroleum resources.

In addition, the committee met on 12 other occasions. One meeting was held in Calgary with senior representatives of the oil industry. A subsequent meeting was convened with the deputy ministers of a number of provincial government departments to advise them of the findings and concerns of the committee.

On behalf of the committee, individual members have attended meetings and hearings of the Community Advisory Council, the Northern Alberta Development Council, the Alberta Trappers Association, the Alberta Fish and Game Association, and a number of other interested groups and organizations.

Very positive and highly enthusiastic responses were encountered. Industry appears anxious to proceed with additional projects and to move into commercial production on a number of pilot activities. It is apparent that many of these facilities are benefiting from new and innovative recovery technology made possible by the cooperative efforts of the Alberta Oil Sands Technology and Research Authority (AOSTRA), industry and other research groups.

Communities are also very positive in their perception of the future. They are eager to share in the renewed growth and vigor which will accompany the increased heavy oil

production made possible by the development and operation of new recovery facilities.

Communities are very much aware of the benefits to be accrued from heavy oil development as well as the extent to which they may differ from the impact of development of a conventional field. Heavy oil recovery is a labor-intensive process, requiring substantially greater investment in local production, treatment and delivery facilities. Beyond the initial construction of such facilities, job opportunities related to their maintenance and servicing will be substantial and permanent. This will bring about long-lasting benefits to the communities involved.

This stability will make it possible for the communities to plan and make the long-range commitments necessary to maximize the positive aspects of development, both for their residents and for Albertans in general.

In one area currently under development, the committee was told that the company would require one new employee for every three wells drilled. When extended to the community level, this ratio becomes one new job for every well. The present forecast by the company calls for some 1 700 new wells in the area over the next two years.

During the course of the committee's travels, many references were made to the mega-projects of the past decade. The committee believes that the impact of the combined mini-projects will be substantially greater than any former mega-project. The smaller projects offer two additional positive considerations for the community:

Firstly, the present smaller projects are numerous and widely dispersed. Thus many more communities will benefit from them.

Secondly, these projects are being developed and implemented over a longer period than former large operations. This will allow communities greater lead time and increased opportunity to plan and benefit from development. Smaller-scale operation will enable the community to work co-operatively and in unison with the developer rather than be overwhelmed by the sheer enormity of the operation.

Concerns expressed by communities to the committee varied greatly. Some established communities are well prepared for development, and the influx of people is looked upon as desirable.

However, the possibility of development in remote underdeveloped areas has the potential of creating a transitional period of social stress. Such areas will be monitored very closely, and the committee will encourage steps be taken to prepare the community for potential development. This is of particular concern in areas where the native population is predominant.

Environmental concerns also vary greatly. Understandably, priorities in agricultrual areas differ from those in forested regions. There is a common awareness that developments may adversely affect water resources, land use, recreation, fish and wildlife. The committee has noted such concerns and will see that the proper authorities address themselves to potential problems, ensuring that any disturbances or adverse conditions are reduced to an acceptable level.

There were some common areas of concern expressed in all the communities visited. Chief among these are the following:

1. Hiring practices during the construction phase of most projects often overlook local labor and expertise.
2. Inequities of the municipal tax system on project areas outside of bedroom communities require consideration of industrial tax transfers.
3. The esthetics of developments is always a concern as projects may mar the landscape if care is not taken to protect it.
4. Transportation is of greater concern now than during the mega-project era because smaller projects are dispersed across the province.
5. Probably the most important concern is that of communication. Many communities voiced a need to know what is going on, a need for as much lead time as possible to plan and prepare for developments, in order to assure that all parties — government, municipalities and industry — are planning in unison for the same goal.

Concern for communication is the major directive given to the Advisory Committee and, within its mandate, it will diligently pursue the need for continuing communication and co-ordination in current and future heavy oil and oil sands developments.

During the year to come, the committee will work to achieve the level of communication that will enable participants to find acceptable solutions to the problems identified.

Summary of Committee Meetings and Travel

July 4, 1983 — Edmonton
Inaugural meeting of the newly established committee.

August 23 - 25, 1983 — Bonnyville
The committee met to examine heavy oil operations at Fort Kent, Wolf Lake and Ethel Lake. The application of slant hole drilling and cluster grouping of wells and the resulting reduction of impact on surface environment was demonstrated. In addition, Ardmore, Grand Centre and Cold Lake were also visited. The committee travelled through the region by helicopter to provide an overview of oil activity in the area. An evening meeting was held in Bonnyville with approximately 30 persons in attendance, representing a wide spectrum of municipal officials and oil industry personnel from the general area. While in Bonnyville, the committee held a regular meeting.

October 5 - 7, 1983 — Fort McMurray
The committee toured the Suncor and Syncrude plants and held discussions with senior management personnel at each facility. In addition, ground and/or air observations were made of the Alsands, Kearl Lake, AOSTRA and AOSERP operations.

Approximately 50 persons representing industry and the community attended an evening session to discuss their concerns for development in the area. The committee had an opportunity to look at new areas of housing and industrial activity in the city.

A meeting was held with regional representation from the Northern Alberta Development Council at the offices of Norm Weiss, MLA for Lac La Biche-McMurray. A regular committee meeting was also held in Fort McMurray.

On its return to Edmonton, the committee flew over the route of the proposed resources road to the Buffalo Creek pilot operation and from there, south to look at the Wabasca-Demarais community and the oil activity in the area.

October 28, 1983 — Edmonton
The committee reviewed its activities in Bonnyville and Fort McMurray.

December 13, 1983 — Edmonton
The committee discussed the proposed resource road to service the Buffalo Creek site.

February 8 - 10, 1984 — Lloydminster
The committee observed the impact of heavy oil activity on a predominantly agricultural area. Inspection of well sites and batteries, a look at Husky's collecting and treatment facilities, and an extensive tour of the Husky Oil refinery were among the committee's field activities.

Approximately 50 guests representing municipal officals, industry and residents of the areas were invited to meet with the committee to discuss the present status of, and future expectations for, development in the Lloydminster area. The committee also held its regular meeting there.

March 19, 1984 — Edmonton
The Hon. John Zaozirny, Minister of Energy and Natural Resources, and Norm Weiss, MLA, chairman of the Northern Alberta Development Council, addressed the committee.

April 15 - 17, 1984 — Peace River
The committee examined the joint AOSTRA/Shell pilot facility near Peace River. A decision has since been made to proceed to commercial production on this operation.

A meeting was held with the Northern Alberta Development Council at its Peace River office. The committee toured the city and gained an appreciation of the high level of activity evidenced by new housing, industrial construction and new recreation facilities.

During an evening session, there was an opportunity to meet with approximately 40 persons representing government, industry and the community. Discussion centered on the infrastructure of the town and its ability to accommodate the impact which will accompany further development of heavy oil resources in the area. The committee held a regular meeting while in Peace River.

On the return trip to Edmonton, the committee stopped at Wabasca to examine the pilot extraction project operating there at the present time.

May 22, 1984 — Calgary
This meeting brought the committee together with senior management of a number of major companies active in oil sands and heavy oil areas of Alberta and whose facilities the committee had visited.

June 11 - 13, 1984 — Elk Point
The committee had an opportunity to examine production and treatment operations at the Lindbergh field. Of particular interest was the impact of development on road systems in the area. The co-operation of industry and the community in the use of waste sand and residual bitumen on these roads was noted.

An evening meeting was held in Elk Point attended by approximately 40 area representatives.

The committee proceeded to Cold Lake/Grand Centre to attend a regional hearing of the Northern Alberta Development Council. A regular committee meeting was held in Grand Centre.

June 20, 1984 — Edmonton
The committee met with Deputy Ministers of 14 departments of the Government of Alberta to acquaint them with the role and function of the committee.

July 9, 1984 — Edmonton
Activities of the past year were reviewed in preparation for publishing the first annual report.